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Paper Title: Increased Readiness and Decreased Maintenance Labor and Cost Through Improved Access to Technical and Performance Data

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Abstract: Readiness can be increased, and cost savings realized across the DoD (multi-service and multi-platform) by applying the principles of Intelligent Technical Data Packages (ITDPs) and Hardware-in-the-Loop (HIL) Simulation to the complex electronic systems that are an integral part of today's warfighting platforms.

An IDTP brings together all of the information necessary to understand the functionality of, and build and maintain a complex piece of hardware from system-level down to component level. This information is tied together with hyperlinks to enable the user to rapidly view any pertinent desired information from a single user interface, without needing to dig through boxes of flat files, or access multiple software programs, each requiring its own user license. It contains all the information necessary for any competent manufacturer to build or repair any LRU in the system without prior design knowledge of the system. This effectively prevents obsolescence and ensures affordability through guaranteed competition.

HIL simulation allows for design changes or new sources of supply for components or LRUs to be proven out through software-based simulation of performance in the LRU all the way through system-level performance. This is possible by modeling system performance down to the component level, and integrating all of these models into a whole system model. What sets HIL simulation apart from strictly software-based simulation modeling, is the inclusion of actual physical hardware LRUs representative of the hardware that makes up the system. The physical hardware can be substituted for the software-based simulation model and vice-versa throughout the system, with identical results. This approach allows a potential design change to be modeled in software, and the performance of the change evaluated throughout the entire system. After the modeled system performance is confirmed, a physical prototype of the change can be fabricated, and installed in the representative hardware LRU in the HIL simulator, and the performance verified in a lab-based environment without the need for expensive on-platform testing.

When combined together, the concepts of an ITDP and an HIL Simulation allows for an extremely rapid ability to verify proposed design changes to counter obsolescence, confirm performance of alternative sources, or prove out new maintenance procedures, all of which significantly enhance readiness. In addition, large cost savings can be realized by proving out performance in a lab environment, minimizing the need for expensive on-platform testing. This concept is being proven out with an ITDP and HIL simulator developed under the Affordable Model-based Open Architecture Radar (AMOR) Navy ManTech project, for the AN/SPS-76 radar which is being considered for implementation aboard both variants of the Littoral Combat Ship.